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NATIONAL ADVISORY COMMITTEE FOR AERONAUTICS.

TECHNICAL MEMORANDUM 93

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AVIATION AND INSURANCE.

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From "Premier Congrès International de
la Navigation Aérienne," Paris, November, 1921, Vol. I.

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To be returned to
the files of the Langley
Memorial Aeronautical
Laboratory.

May, 1922.

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AVIATION AND INSURANCE.*

By R. H. Mayo.

Under present conditions, transportation by air is not a commercial proposition. Nevertheless, the governments of nearly all the great powers have definitely decided to grant aid to air traffic companies, so that they may not be jeopardized by financial difficulties.

This government aid chiefly takes the form of direct subsidies. France has granted such large subsidies that French commercial aviation seems to be enjoying a considerable degree of prosperity. England has offered less generous subsidies and English aviation is just so much less prosperous. In reality, both the French and English commercial air services are in a very unsatisfactory condition. The air traffic companies of both countries do not pay expenses without aid and will probably not be able to do so for many years to come. The reasons for this state of affairs are too many and complex for me to attempt any general consideration of them in this article.

There is, however, one aspect of the question which is all-important for the future development of commercial aviation, to wit, aviation insurance, concerning which it may be worth while to make a few remarks based on the experience acquired since the beginning of civil aviation.

It may be said, with reason, that there is no large industry in which insurance does not play an important role. The stability

* From "Premier Congrès International de la Navigation Aérienne," Paris, November, 1921, Vol. I, pp. 182-187.

of companies engaged in the older forms of transportation depends in large measure, on moderation in insurance rates. The public would never invest its money in any enterprise of transportation by water, if, on every trip, the stockholders had to risk the loss of their capital in case of accident. If the Lloyds should suddenly go out of business, British transportation enterprises by water and a goodly number of similar foreign enterprises would go out of business the next day. It may be said that the existence of satisfactory insurance conditions is indispensable to the commercial prosperity of any enterprise whose capital is invested in anything susceptible of being damaged or destroyed.

As regards air traffic companies, an insurance system is gradually being established, but the existence of this system is still precarious and its development has not been so rapid as had been hoped. The object of this article is to consider some of the causes which hinder its development.

Nature of Aviation Risks.

There are four principal kinds of civil aviation insurance:

1. Legal responsibility of air traffic companies:
 - a) Toward passengers;
 - b) Toward employees;
 - c) Regarding freight.
2. Personal insurance of passengers and pilots.
3. Damage to third parties.
4. Damage to airplanes and other property of aviation companies.

It is evident that, in general, conditions affecting one of the above classes of insurance also affect all the others. If a company suffers but little damage to its aircraft, its passengers and employees are rarely injured. However, it does not follow necessarily that a company, whose employees and passengers are rarely the victims of accidents, seldom suffers damage to its airplanes. An analysis of the statistics of accidents, that have happened in civil aviation since the armistice, shows that the number of accidents, in which the pilot and passengers were killed or even injured, has been remarkably small. It is doubtless due to this fact that civil aviation has prospered as it has and that the number of passengers carried has risen so rapidly and constantly. The number of airplane accidents, however, has been lamentably high. When an accident causes the death of several passengers, the newspapers display it on the first page, so that the attention of the public is forcibly drawn to it. If, on the other hand, there is an accident in which there are no victims among the passengers or crew, the public hears nothing of it. This attitude is very natural, of course, and it is evidently to the advantage of air traffic companies not to have their losses continually displayed before the public. Nevertheless, the companies must, in their own interest, frankly face the situation and make a determined effort to reduce the number of accidents. The accidents in question are not simple unimportant incidents, causing, for example, the wreck of a landing gear or propeller,

but serious accidents, sometimes causing the complete destruction of the airplane. In many cases, passengers and pilot have escaped death or severe injuries only through a fortunate combination of circumstances.

While these accidents have not been noted by the public, they have been very carefully considered by insurance companies. It is not correct to believe, as is commonly done, that insurance companies or their technical advisers lack practical experience and that the technical sides of aviation are not familiar to them. On the contrary, they keep well informed on all these questions and know the exact significance of such accidents. They fully realize that the relative immunity of air traffic companies, as regards fatal accidents, has been due to good luck, rather than to the efficiency of technical organizations. Some companies, having to their discredit a considerable number of accidents, have been insured, if not against all their risks, at least against some of them. The result is that insurance companies, which had the courage to engage in aviation insurance, are far from being remunerated for their efforts. It follows inevitably that insurance premiums must be increased, rather than reduced. Moreover, it cannot be expected that insurance companies will continue to take aviation risks, if the present situation remains unchanged. Thus far, French insurance companies have kept in touch with the progress of civil aviation and have been awaiting the time when the latter could offer a satisfactory basis

for fixing the rates. Practically all aviation insurance has been undertaken by English insurance companies and their experience has been such as to discourage French companies from following their example until conditions improve. Aviation insurance ventures undertaken by English companies have not, in fact, been successful and several large companies have been obliged to stop taking aviation risks.

Causes of Accidents.

The frequent accidents to airplanes employed on air routes have been due to widely divergent causes. Probably 90% of them were due to carelessness and could have been avoided, had the necessary precautions been taken. The principal causes of accidents may be enumerated as follows:

1. Poor piloting;
2. Engine trouble;
3. Lack of system;
4. Poorly adapted airplanes;
5. Poor airdromes;
6. Unfavorable meteorological conditions.

1. - Poor Piloting.

A certain number of pilots employed on international air routes have had long and varied experience and are fully qualified for this difficult work, but it is evident that a large proportion of the pilots employed are by no means of the first order.

In order that transportation by air may be reasonably entrusted to a pilot, he must possess very special qualifications. He must have had much experience in piloting, particularly under unfavorable weather conditions. He must know his route, his airplane and his engine and, above all, he must be resolute and cool. Such pilots are rare and, of course, can command high salaries. If companies would consider that pilots of the first rank would save much more than their salaries during the course of the year by knowing how to avoid accidents, they would realize the false economy of employing inexperienced pilots. It is generally believed that only the best pilots are employed in commercial aviation. Such is not at all the case. In reality, the salaries offered by most companies are so small that no first-class pilot can accept them. The result is apparent in an analysis of the accidents, a high percentage of which are found to be due to poor piloting.

Sometimes the most elementary errors have been committed from lack of experience. Sometimes expensive airplanes and even the lives of several ^{passengers} have been entrusted to young pilots who did not know the route. Some English and French companies employ only first-class pilots, with beneficial results, as regards their expenses for repairs or their insurance premiums. It is evidently difficult, however, for an insurance company to form an exact idea of the respective qualities of each pilot and, so long as most air traffic companies continue to employ any poor pilots,

insurance rates will necessarily remain high. In England, the different insurance companies associated with Lloyds have established a register containing information on all licensed British pilots, including in most cases, details of their experience. This register has given good results in England and it is to be hoped that a similar register may be established in France.

3. - Engine Trouble.

Thus far, civil aviation has had to use engines designed for war. Such engines, though little adapted to their present use, usually run all right, provided all possible precautions are taken.

For many reasons, however, there have been innumerable cases of engine trouble on nearly every type of engine employed on air traffic lines. One of these reasons is that the engines are not in proper condition when delivered to the air traffic companies. They were made, for the most part, during the war, or of parts taken from war stocks, and have not been given the attention necessary to eliminate defective parts. Another source of trouble is the fact that all the war engines were built for efficiency, rather than safety, so that, in order to keep them in proper condition, they require the attention of the best mechanics detailed verification tests and frequent overhauling. Troubles also often result from faulty installation of the engine. The manner of installing engines on airplanes now in use still has many disadvantages which existed before the war and it is only at the price of the most alert and conscientious attention of the

mechanics that trouble can be avoided. If it is true that most companies employ quite competent mechanics, there is still room for considerable improvement, as evidenced by the large number of cases of engine trouble.

The prize recently offered by the French committee on aeronautic propaganda, for a commercial engine, is a step in the right direction. As soon as engine troubles are eliminated or nearly eliminated, insurance rates will fall.

3. - Lack of System.

The systemization of the air service comprises a large number of new problems, which cannot be completely solved without much more experience. It is manifestly impossible to consider all these problems in detail in so short an article, but it may be noted that a large number of accidents may be ascribed to lack of system.

The directors of air traffic companies sometimes have a tendency to forget that the foundation of success lies in a technically perfect system. They sometimes seem to imagine themselves still in the time of the war, when the only important thing was to accomplish the allotted task and the destruction of an airplane was a matter of small concern.

The success of any commercial enterprise will always depend largely on the systematic organization of the personnel and the employment of competent engineers for superintending all technical operations.